

CLAIMS

What is claimed is:

1. A finger comprising:

an antenna signal combiner for combining signals received by a plurality of antenna and having the almost same time delays with an adequate delay to produce multiplexed signals;

a tracking apparatus for receiving said multiplexed signals to estimate time delay information on said multiplexed signals;

a de-spreading apparatus for de-spreading said multiplexed signals with said estimated time delay information, each of which are received from said antenna signal combiner and said tracking apparatus, respectively; and

a demodulating apparatus of demodulating said de-spread signals received from said de-spreading apparatus, to estimate original signals received by said plurality of antennas.

2. The finger according to claim 1, further including a multiplexer for receiving said de-spread signals from said de-spreading apparatus, extending the distance between signals of said de-spread signals to produce transformed de-spread signals and transmitting said transformed de-spread signals to said demodulating apparatus.

3. The finger according to claim 1, wherein said tracking apparatus includes a time delay information estimator for estimating each of time delay information on said multiplexed signals received from said antenna signal combiner using a time division method, a demultiplexer for demultiplexing said time delay information, a plurality of storage means for storing each of said demultiplexed signals and a combiner for adequately selecting or combining the result in which the procedure from said demultiplexer to said storage means is repeated during a predetermined time or by a predetermined number of times to estimate time delay information on said demultiplexed signals.

4. The finger according to claim 1, wherein said de-spreading apparatus includes a de-spread information extractor for receiving the estimated time delay information from said tracking apparatus and said multiplexed signals from said antenna signal combiner to de-spread each of the signals using a time division method, a demultiplexer for demultiplexing said de-spread signals and a plurality of storage means for storing each of said de-spread signals, wherein the procedure from said de-spread information extractor to said storage means is repeated during a predetermined time or by a predetermined number of times to de-spread said multiplexed signals.

5. The finger according to claim 1, wherein said demodulating apparatus includes a transmitting signal estimator for performing a demodulating process of each of the signals per the plurality of antennas for said multiplexed signals received from said multiplexer, using the time division method, and a combiner for adequately selecting and combining the output signals from said transmitting signal estimator to estimate original signals received by the plurality of antennas.

6. The finger according to claim 1, further including a channel estimating apparatus for estimating channel information of said de-spread signals received from said de-spreading apparatus.

7. The finger according to claim 6, wherein said channel estimating apparatus includes a channel state estimator for receiving said multiplexed signals from said multiplexer to estimate channel information on the signals per the plurality of the antennas using a time division method, a demultiplexer for demultiplexing the output signals from said channel state estimator and a plurality of storage means for storing said demultiplexed signals from said demultiplexer, so that channel information on each of said antennas basis is estimated.

8. The finger according to claim 1, wherein said demodulating apparatus demodulates only said de-spread signals from said de-spread apparatus to estimate original signals received by said plurality of antennas.

9. A RAKE receiver comprising:

a RF analog to baseband digital converter for converting RF analog signals received by a plurality of antennas having the almost same time delays into baseband digital signals;

a signal searcher for receiving the output signals from said RF analog to baseband digital converter to generate information on the intensity of the baseband digital signals;

a signal controller for receiving information on the intensity of the signals for said signal searcher and the output signals from said RF analog to baseband digital converter to send the M number of the signals among the output signals from said RF analog to baseband digital converter using the information on the intensity of said signal; fingers for receiving the M number of signals from said signal controller to estimate a common time delay information in the received M number of signals and for estimating original signals received per the plurality of antennas using said estimated time delay information and a time division method; and

a combiner for receiving said estimated original signals from said fingers and for combining said original signals, to thus estimate original signals received by the plurality of antennas.

10. The RAKE receiver according to claim 9, wherein said finger includes:

an antenna signal combiner for combining signals received by a plurality of antenna and having the almost same time delays with an adequate delay to produce multiplexed signals;

a tracking apparatus for receiving said multiplexed signals to estimate time delay information on said multiplexed signals;

a de-spreading apparatus for de-spreading said multiplexed signals with said estimated time delay information, each of which are received from said antenna signal combiner and said tracking apparatus, respectively; and

a demodulating apparatus of demodulating said de-spread signals received from said de-spreading apparatus, to estimate original signals received by said plurality of antennas.

11. The RAKE receiver according to claim 10, further including a multiplexer for receiving said de-spread signals from said de-spreading apparatus, extending the distance between signals of said de-spread signals to produce transformed de-spread signals and transmitting said transformed de-spread signals to said demodulating apparatus.

12. The RAKE receiver according to claim 10, wherein said tracking apparatus includes a time delay information estimator for estimating each of time delay information on said multiplexed signals received from said antenna signal combiner using a time division method, a demultiplexer for demultiplexing said time delay information, a plurality of storage means for storing each of said demultiplexed signals and a combiner for adequately selecting or combining the result in which the procedure from said demultiplexer to said storage means is repeated during a predetermined time or by a predetermined number of times to estimate time delay information on said demultiplexed signals.

13. The RAKE receiver according to claim 10, wherein said de-spreading apparatus includes a de-spread information extractor for receiving the estimated time delay information from said tracking apparatus and said multiplexed signals from said antenna signal combiner to de-spread each of the signals using a time division method, a demultiplexer for demultiplexing said de-spread signals and a plurality of storage means for storing each of said de-spread signals, wherein the procedure from said de-spread information extractor to said storage means is repeated during a predetermined time or by a predetermined number of times to de-spread said multiplexed signals.

14. The RAKE receiver according to claim 10, wherein said demodulating apparatus includes a transmitting signal estimator for performing a demodulating process of each of the signals per the plurality of antennas for said multiplexed signals received from said multiplexer, using the time division method, and a combiner for adequately selecting and combining the output signals from said transmitting signal estimator to estimate original signals received by the plurality of antennas.

15. The RAKE receiver according to claim 10, wherein said finger includes a channel estimating apparatus for estimating channel information of said de-spread signals received from said de-spreading apparatus.

16. The RAKE receiver according to claim 10, wherein said channel estimating apparatus includes a channel state estimator for receiving said multiplexed signals from said multiplexer to estimate channel information on the signals per the plurality of the antennas using a time division method, a demultiplexer for demultiplexing the output signals from said channel state estimator and a plurality of storage means for storing said demultiplexed signals from said demultiplexer, so that channel information on each of said antennas basis is estimated.

17. The RAKE receiver according to claim 10, wherein said demodulating apparatus demodulates only said de-spread signals from said de-spread apparatus to estimate original signals received by said plurality of antennas.

18. A method of estimating signals of a finger, comprising:
a first step of combining signals received by a plurality of antenna and having the almost same time delays with an adequate delay to produce multiplexed signals;
a second step of estimating a common time delay information on said multiplexed signals;

a third step of de-spreading said multiplexed signals using said estimated time delay information to produce de-spread signals;

a fourth step of estimating channel information on said de-spread signals; and

a fifth step of demodulating said de-spread signals on signals of each of the antennas basis using said estimated channel information to estimate signals received by said plurality of antennas.

19. The method according to claim 18, wherein said third step further includes:

a first sub-step of extending the distance between said de-spread signals to produce transformed de-spread signals; and

a second sub-step of transmitting said transformed de-spread signals to said fourth step and said fifth step, respectively.